

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: Takayuki Gomi et al. ATTORNEY DOCKET NO.: P97,2608
SERIAL NO: 08/965,286 GROUP ART UNIT: 2811
FILED: November 6, 1997 EXAMINER: O. Nadav
INVENTION: BIPOLAR TRANSISTOR AND METHOD OF THE SAME

AMENDMENT

Assistant Commissioner of Patents
Washington, D.C. 20231
S I R:

In response to the Office Action mailed on March 17, 2000, Applicants herein amend the above-identified application and respond as follows:

In the Claims:

Please amend claim 1 as follows:

1. (Amended) A semiconductor device, comprising a first vertical type high speed NPN bipolar transistor and a second vertical type high voltage NPN bipolar transistor having a breakdown voltage which is higher than a breakdown voltage of said first vertical type high speed NPN bipolar transistor, the device including an epitaxial layer formed on a silicon substrate, wherein said first vertical type high speed NPN bipolar transistor has a first embedded diffusion layer formed in an upper part of said silicon substrate, said first embedded diffusion layer having a same conductive type as said epitaxial layer and having an impurity concentration higher than that of said epitaxial layer, said second vertical high voltage NPN bipolar transistor having a second embedded diffusion layer formed in an upper part of said silicon substrate, said second embedded diffusion layer having a same conductive type as said epitaxial layer and having an impurity concentration which is both less than the impurity concentration of said first embedded diffusion layer and at least as high as the impurity concentration of said epitaxial layer. said second embedded diffusion layer having a depth which is greater than a depth of said first embedded diffusion layer, wherein said second embedded diffusion layer is a terminal of said second vertical type high voltage NPN bipolar transistor.

REMARKS

In the Office Action dated March 17, 2000, the Examiner rejected claims 1, 3, 4, 6, 19 and 20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,379,726 to Kumamaru et al. or Japanese Patent 358014564 A to Aomura. Applicants submit that as a result of the above-noted amendments, the claims of the present invention are, in fact, patentable over the cited references.

Specifically, Applicants wish to point out that independent claim 1 of the present application has now been amended so as to include the limitations that (a) the impurity concentration of the second embedded diffusion layer is at least as high as the impurity concentration of the epitaxial layer, and (b) the second embedded diffusion layer has a depth which is greater than a depth of the first embedded diffusion layer.

GAU 2811



CHICAGO OFFICE
TELEPHONE (312) 876-0200
TELECOPIER (312) 876-0898

HILL & SIMPSON
A PROFESSIONAL CORPORATION
ATTORNEYS AND COUNSELORS AT LAW
85TH FLOOR SEARS TOWER
CHICAGO, ILLINOIS 60606

WASHINGTON OFFICE
SUITE 1004-BLDG.1
2001 JEFFERSON DAVIS HWY.
CRYSTAL CITY
ARLINGTON, VIRGINIA 22202
TELEPHONE (703) 415-1515

In re application of: Takayuki Gomi et al. ATTORNEY DOCKET NO.: P97,2608-01
Serial No.: 08/965,286 GROUP ART UNIT: 2811
Filed: November 6, 1997 EXAMINER: O. Nadav
For: BIPOLAR TRANSISTOR AND METHOD OF THE SAME

AMENDMENT

Assistant Commissioner for Patents
Washington D.C. 20231

SIR:

Transmitted herewith is an amendment in the above-identified application.

☒ No additional fee is required.

The fee has been calculated as shown below.

CLAIMS AS AMENDED						
	(2) CLAIMS REMAINING AFTER AMENDMENT		(4) HIGHEST NO. PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEE
TOTAL CLAIMS		MINUS			() X 9.00 () X 18.00	
INDEP. CLAIMS		MINUS			() X 39.00 () X 78.00	
Application amended to contain any multiple dependent claims not previously paid for.				() YES () NO	() \$130.00 () \$260.00 ONE TIME	
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT						-0-

* If the entry in Column 2 is less than the entry in Column 4, write "0" in Column 5.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20 write "20" in this space.

- ☐ Applicant petitions the Commissioner of Patents and Trademarks to extend this time for response to the Office Action dated _____ or _____ months so that the period for response is extended to _____. A check in the amount of \$ _____ is attached to cover the cost of the extension. Any deficiency or overpayment should be charged or credited to deposit account No. 08-2290. A duplicate copy of this sheet is enclosed.
- ☐ A check in the amount of \$ _____ is attached.
- ☐ A check for \$ _____ accompanying IDS under 37 CFR 1.97(c) is attached.
- ☐ A check for \$ _____ and Petition for Consideration of IDS under 37 CFR 1.97(d) is attached.
- ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 08-2290. A duplicate of this sheet is enclosed.
- When phoning re this application, please call 312/876-0200.

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BY William E. Vaughan (Reg. No. 39,056)

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on June 19, 2000.

William E. Vaughan (Registration No. 39,056)

NAME OF APPLICANT'S ATTORNEY

SIGNATURE

June 19, 2000

DATE